

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: Not Yet Assigned

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Applicant: Akira ARAI, et al.

Group Art Unit: Not Yet Assigned

Examiner: Not Yet Assigned

Title: METHOD OF MANUFACTURING MAGNETIC
MATERIALS, AND RIBBON-SHAPED MAGNETIC
MATERIALS, POWDERED MAGNETIC MATERIALS
AND BONDED MAGNETS

Attorney Docket: 9319A-000203

Hon. Commissioner of Patents and Trademarks
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Prior to the examination of this application, please amend it as follows:

IN THE CLAIMS

Claim 3. (AMENDED) The method as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a material having a heat conductivity lower than a heat conductivity of the structural material of the roll base at or around room temperature.

Claim 4. (AMENDED) The method as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a ceramic.

Claim 5. (AMENDED) The method as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a material having a heat conductivity equal to or less than $80\text{Wm}^{-1}\text{K}^{-1}$ at or around room temperature.

Claim 6. (AMENDED) The method as claimed in claim 2, wherein the outer surface layer of a cooling roll is formed of a material having a coefficient of thermal expansion in a range of $3.5 - 18(\times 10^{-6}\text{K}^{-1})$ at or around room temperature.

Claim 7. (AMENDED) The method as claimed in claim 2, wherein an average thickness of the outer surface layer of the cooling roll is 0.5 to $50\mu\text{m}$.

Claim 8. (AMENDED) The method as claimed in claim 2, wherein an outer surface layer of the cooling roll is manufactured without experiencing a machining process.

Claim 9. (AMENDED) The method as claimed in claim 1, wherein a surface roughness R_a of a portion of the circumferential surface where the gas expelling means is not provided is $0.05 - 5\mu\text{m}$.

Claim 11. (AMENDED) The method as claimed in claim 10, wherein an average width of the groove is $0.5 - 90\mu\text{m}$.

Claim 12. (AMENDED) The method as claimed in claim 10, wherein an average depth of the groove is 0.5 - 20 μ m.

Claim 13. (AMENDED) The method as claimed in claim 10, wherein an angle defined by a longitudinal direction of the groove and a rotational direction of the cooling roll is equal to or less than 30 degrees.

Claim 14. (AMENDED) The method as claimed in claim 10, wherein the groove is formed spirally with respect to a rotation axis of the cooling roll.

Claim 16. (AMENDED) The method as claimed in claim 10, wherein the groove has openings located at peripheral edges of the circumferential surface.

Claim 17. (AMENDED) The method as claimed in claim 10, wherein a ratio of a projected area of the groove or grooves with respect to a projected area of the circumferential surface is 10 - 99.5%.

Claim 19. (AMENDED) A ribbon-shaped magnetic material which is manufactured by the method described in claim 1.

Claim 20. (AMENDED) The ribbon-shaped magnetic material as claimed in claim 19, wherein an average thickness thereof is 8 - 50 μ m.

Claim 22. (AMENDED) The powdered magnetic material as claimed in claim 21, wherein the powdered magnetic material is subjected to at least one heat treatment during or after a manufacturing process thereof.

Claim 23. (AMENDED) The powdered magnetic material as claimed in claim 21, wherein a mean particle size of the powder is 1 - 300 μ m.

Claim 25. (AMENDED) The powdered magnetic material as claimed in claim 24, wherein a volume ratio of the R₂TM₁₄B phase with respect to the whole structural composition of the powdered magnetic material is equal to or greater than 80%.

Claim 26. (AMENDED) The powdered magnetic material as claimed in claim 24, wherein an average grain size of the R₂TM₁₄B type phase is equal to or less than 500nm.

Claim 27. A bonded magnet which is manufactured by binding the powdered magnetic material as claimed in claim 22 with a binding resin.

Claim 28. The bonded magnet as claimed in claim 27, wherein an intrinsic coercive force (H_{CJ}) of the bonded magnet at room temperature lies within a range of 320 - 1200 kA/m.

Claim 29. The bonded magnet as claimed in claim 27, wherein a maximum magnetic energy product $(BH)_{\max}$ of the bonded magnet is equal to or greater than 40kJ/m^3 .

FIG. 10 is a cross-sectional view of the bonded magnet assembly 100.

REMARKS

The purpose of this preliminary amendment is to clarify the translation for purposes unrelated to patentability and remove multiple dependent claims to reduce filing costs.

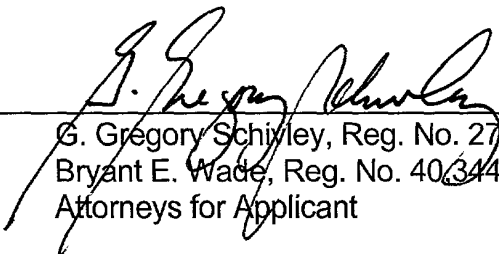
Favorable consideration of this application is respectfully requested.

Respectfully submitted,

Date: April 12, 2001

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ATTACHMENT FOR CLAIM AMENDMENTS

The following is a marked up version of each amended claim in which underlines indicates insertions and brackets indicate deletions.

Claim 3. (AMENDED) The method as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a material having a heat conductivity lower than [the] a heat conductivity of the structural material of the roll base at or around [a] room temperature.

Claim 4. (AMENDED) The method as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a ceramic[s].

Claim 5. (AMENDED) The method as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a material having a heat conductivity equal to or less than $80\text{Wm}^{-1}\text{K}^{-1}$ at or around [a] room temperature.

Claim 6. (AMENDED) The method as claimed in claim 2, wherein the outer surface layer of a cooling roll is formed of a material having a coefficient of thermal expansion in [the] a range of $3.5 - 18(\times 10^{-6}\text{K}^{-1})$ at or around [a] room temperature.

Claim 7. (AMENDED) The method as claimed in claim 2, wherein [the] an average thickness of the outer surface layer of the cooling roll is 0.5 to 50 μm .

Claim 8. (AMENDED) The method as claimed in claim 2, wherein [the] an outer surface layer of the cooling roll is manufactured without [experience of] experiencing a machining process.

Claim 9. (AMENDED) The method as claimed in claim 1, wherein [the] a surface roughness Ra of a portion of the circumferential surface where the gas expelling means is not provided is 0.05 - 5 μ m.

Claim 11. (AMENDED) The method as claimed in claim 10, wherein [the] an average width of the groove is 0.5 - 90 μ m.

Claim 12. (AMENDED) The method as claimed in claim 10, wherein [the] an average depth of the groove is 0.5 - 20 μ m.

Claim 13. (AMENDED) The method as claimed in claim 10, wherein [the] an angle defined by [the] a longitudinal direction of the groove and [the] a rotational direction of the cooling roll is equal to or less than 30 degrees.

Claim 14. (AMENDED) The method as claimed in claim 10, wherein the groove is formed spirally with respect to [the] a rotation axis of the cooling roll.

Claim 16. (AMENDED) The method as claimed in claim 10, wherein the groove has openings located at [the] peripheral edges of the circumferential surface.

Claim 17. (AMENDED) The method as claimed in claim 10, wherein [the] a ratio of [the] a projected area of the groove or grooves with respect to [the] a projected area of the circumferential surface is 10 - 99.5%.

Claim 19. (AMENDED) A ribbon-shaped magnetic material which is manufactured by the method described in [any one of claims 1 to 17] claim 1.

Claim 20. (AMENDED) The ribbon-shaped magnetic material as claimed in claim 19, wherein [the] an average thickness thereof is 8 - 50 μ m.

Claim 22. (AMENDED) The powdered magnetic material as claimed in claim 21, wherein the powdered magnetic material is subjected to at least one heat treatment during or after [the] a manufacturing process thereof.

Claim 23. (AMENDED) The powdered magnetic material as claimed in claim 21, wherein [the] a mean particle size of the powder is 1 - 300 μ m.

Claim 25. (AMENDED) The powdered magnetic material as claimed in claim 24, [the] wherein a volume ratio of the $R_2TM_{14}B$ phase with respect to the whole structural composition of the powdered magnetic material is equal to or greater than 80%.

Claim 26. (AMENDED) The powdered magnetic material as claimed in claim 24, wherein [the] an average grain size of the $R_2TM_{14}B$ type phase is equal to or less than 500nm.

Claim 27. A bonded magnet which is manufactured by binding the powdered magnetic material as claimed in [any one of claims 22 to 26] claim 22 with a binding resin.

Claim 28. The bonded magnet as claimed in claim 27, wherein [the] an intrinsic coercive force (H_{CJ}) of the bonded magnet at [a] room temperature lies within [the] a range of 320 - 1200 kA/m.

Claim 29. The bonded magnet as claimed in claim 27, wherein [the] a maximum magnetic energy product $(BH)_{max}$ of the bonded magnet is equal to or greater than 40kJ/m³.